EFFECTIVITY OF Fe-Al ELECTRODES COMBINATION FOR ELECTROCOAGULATION OF DISPOSABLE MASKS WASTE

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ABSTRACT

Disposable mask has increased significantly since the Covid-19 pandemic. This waste has a very significant impact because it releases microplastics found in the environment, especially the aquatic environment. This study aims to determine the effect of the type of electrode (Al and Fe), the combination of electrodes (Al-Fe, Al-Fe-Al) and the arrangement of the electrodes Al-Fe-Al-Fe on the efficiency of reducing the concentration of microplastics in mask waste.

This study begins with the collection of a mask waste sample, namely a blue surgical mask consisting of 3 layers. Samples were cut to a size of 0.5 cm and soaked in distilled water for 3 weeks to obtain microplastics that were released from the mask. The sample is separated from the liquid so that a sample of microplastics is obtained in distilled water. Mask samples were analyzed using FTIR. Microplastic samples separated from the mask were electrocoagulated using (Al-Fe), (Al-Fe-Al), (Fe-Al-Fe), (Al-Fe-Al-Fe) and (Al-Fe-Fe-Al) electrodes for 4 hours with an electric current of 5 Ampere. The electrocoagulation process was carried out with a sample volume of 500 mL, pH 6 and the addition of a surfactant in the form of alkyl benzene sulfonate (ABS) 20 mg/L. The floc formed was characterized by FTIR and the sample of the liquid was analyzed for the number of fibers using a microscope at a magnification of 40 times. Microplastic reduction efficiency was calculated by comparing the number of fibers before and after electrocoagulation.

The results showed that the waste mask consisted of 3 layers containing functional groups indicating the presence of polypropylene and polyvinyl chloride. The number of microplastic fibers released from the mask after immersion for 3 weeks was 20,000 strands of fiber/500 mL or 40 strands of fiber/µL. Fiber reduction efficiency after electrocoagulation for 4 hours at 5 Ampere with (Al-Fe), (Al-Fe-Al), (Fe-Al-Fe), (Al-Fe-Al-Fe) and (Al-Fe-Al) electrodes. Fe-Al) were 82.50%, 87.50%, 87.50%, 90.00% and 87.50%, respectively. The number and arrangement of electrodes affect the effectiveness of microplastic fiber reduction after electrocoagulation. The more number of electrodes can increase the effectiveness of reducing microplastic fibers. Alternate arrangement of Al-Fe electrodes was more effective in reducing microplastics by electrocoagulation.

Kata Kunci: *mask, microplastic, electrocoagulation, electrode*